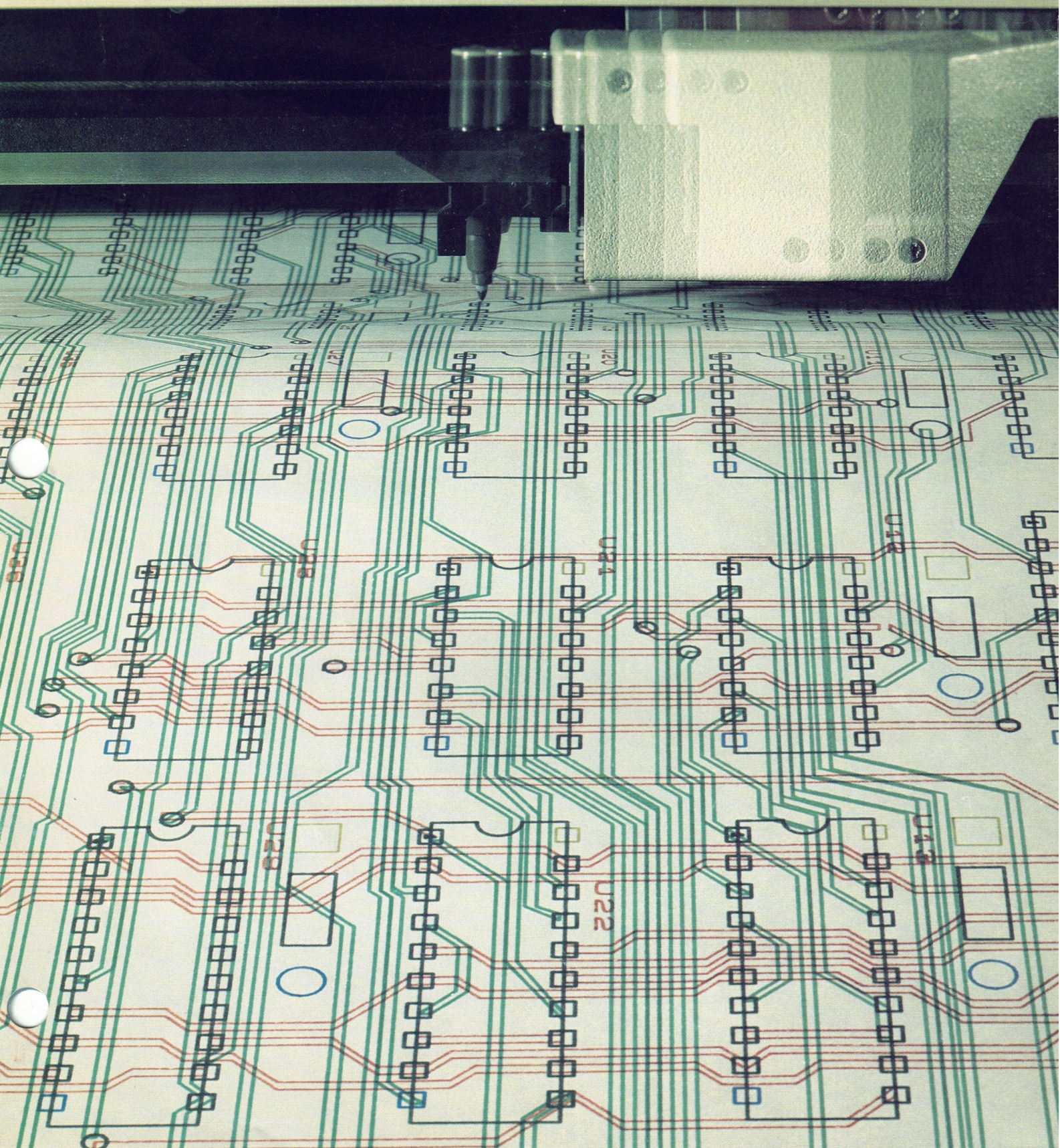
HEWLETT PACKARD

The 7580B and 7585B Drafting Plotters

RS-232-C

DESIGNED FOR HP-IB SYSTEMS

TECHNICAL DATA, FEBRUARY 1983



Find out why Hewlett-Packard drafting plotters are the most popular large-format plotters on the market.

When Hewlett-Packard first introduced its drafting plotters, response was enthusiastic. Engineers and architects applauded the plotters' exceptional line quality, high throughput, and low price tags. Users liked the plotters' trouble-free operation, the compact size, and their ability to be moved easily from one area to another.

Now HP drafting plotters are even better. The new 7580B and 7585B have all of the features our customers appreciate, plus three enhancements:

Higher accuracy. Your plots can be accurate to within 0.1 percent of a specified move or within 0.25 mm, whichever is greater.

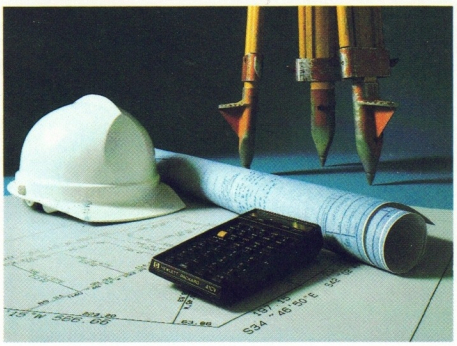
Dual interface. You can select either HP-IB (IEEE 488-1978) or RS-232-C/CCITT V.24 from a switch on the rear panel.

Two RS-232 connectors. Now, just one computer port will support both the plotter and a terminal, making remote modem operation very convenient.

If you demand a lot from a drafting plotter, you should learn more about these enhancements and all of the other features of the new 7580B and 7585B.

Low Cost

The 7580B and 7585B are low-cost plotters, but that doesn't mean that you compromise on quality or through-



put. The performance of these plotters compares favorably with plotters costing twice as much. And they offer features, such as eight pens and automatic pen capping, that you can't find in most of the more expensive plotters. Whether you're interested in low cost or maximum performance, HP drafting plotters are cost-effective additions to almost any system.

Suited to Many Applications

HP drafting plotters are suited for most applications that require large, visually perfect plots. The 7580B accepts media sizes up to A1/D; the 7585B accepts sizes up to A0/E. Both plotters can also be used with media as small as A4/A and will plot on paper, vellum, or double-matte polyester film. The writing system of the 7580B and the 7585B makes them especially useful if your application requires drafting pens or multicolor drawing capability.

The more common uses in industry include computer-aided drafting; computer-aided design of printed circuit boards, integrated circuits, and mechanical parts; architectural or civil engineering design; and mapping applications. In business and management, these plotters are most commonly used to prepare flip-charts and project schedules.

HP drafting plotters read the pen-type code from the carousel and automatically set pen velocity and force.

Eight Pens with Automatic Capping

The 7580B and 7585B are eight-pen plotters. They accept three kinds of pens: fiber tip, drafting, and roller ball. This permits you to choose the pens, colors, and line widths most appropriate for your application.

Pens are loaded into an eight-pen carousel which caps any pens not in use. Capped pens stay fresh; even drafting pens write without repriming and won't dry out for up to several days. This means you don't handle pens as often as with traditional drafting plotters.

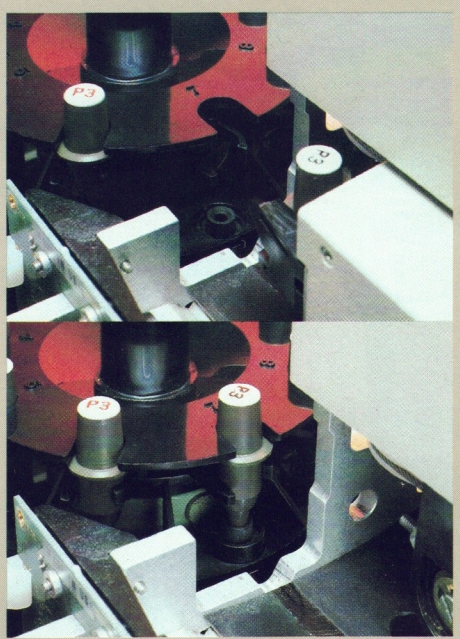
There are three different pen carousels — one for each kind of pen. Each carousel is coded so that the plotter electronically senses the carousel type each time a carousel is loaded. After reading the code, the plotter sets the pen velocity and force suitable for pens that match the carousel type. If other values are better suited to your application, velocity and force can be changed from the front panel or through programmed plotter instructions. Because pen force and velocity can be set for individual pens, different types of pens can be mixed in the same carousel.

As the pen is lowered to the surface of the drawing medium, pen motion is damped so that the pen gently touches the surface with minimum bounce. This protects the pen tip from damage. As a result, pens last longer and plotted lines are uniform. The platen of the HP drafting plotters has a groove under the pen path that causes the pen motion over the medium to be cushioned by the air underneath. This cushion is another reason that your pens last longer and that lines drawn by the HP drafting plotters are smooth and consistent.

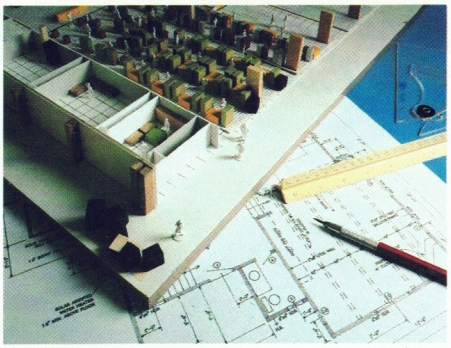
Superior Line Quality

Resolution is the most important factor that affects line quality. While the addressable resolution of the HP drafting plotters is excellent at 0.0250 mm (0.000984 in.), the pen and drawing medium actually move on an even finer grid to create high-quality lines. These movements are controlled by servos with a mechanical resolution of 0.003 mm (0.00012 in.). As a result, the resolution of these plotters is as good as that of plotters costing twice as much.

In addition to outstanding resolution, HP drafting plotters offer a feature not found in any other drafting plotter: diagonal lines are the same high quality as lines drawn parallel to the axes. On most plotters, diagonal pen movements have a faster velocity than movements along the axes. With



Top: As the pen is returned to its stall, the cap is lowered so that the pen tip is not damaged as the pen is replaced.
Bottom: While stored in the stall, the pen is tightly capped.



this increased diagonal velocity, line quality may deteriorate. But with the 7580B and 7585B, the microprocessor keeps pen velocity and acceleration constant regardless of direction. Lines are therefore drawn with the same high quality in any direction.

Accurate

When a plotter receives a command to draw a vector, three factors determine how precisely the plotted endpoint will correspond to the commanded endpoint: the operator, the expansion or contraction of the medium, and the mechanical accuracy of the plotter.

HP drafting plotters have built-in algorithms to compensate for mechanical inaccuracy. As a result, your plots can be accurate to within 0.1 percent of a specified move or 0.25 mm, whichever is greater.

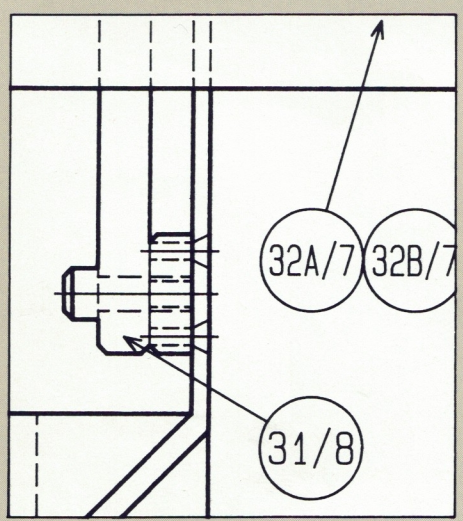
High Throughput

At 60 cm/s maximum velocity and 4 g acceleration, the 7580B and 7585B are among the fastest plotters in their price range. Even when a slower pen-down speed is required to accommodate the drawing medium, throughput remains high because pen-up movements are executed at maximum speed. And pen-lift delays are minimized because the pen is lifted slightly for small moves — as when labeling — and to maximum height only on long moves.

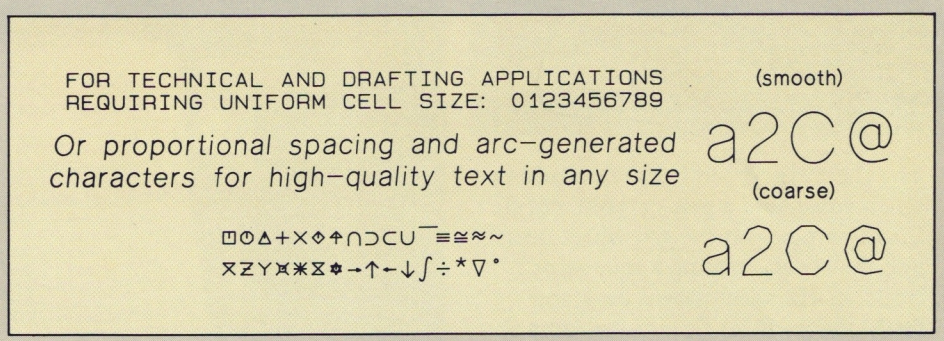
Six Character Sets in Two Fonts

The HP drafting plotters have six character sets that provide a wide range of labeling and annotation capabilities, including mapping symbols, special centered symbols, and foreign-language characters. These six sets are contained in two fonts that give you a choice of character style according to your plotting application. One font provides high resolution "stick" characters with equal spacing between characters. The second font uses arc-based characters with proportional spacing. In the second font, characters can be changed from a very smooth and refined quality to a coarser quality. The highest quality characters — which resemble characters produced by LEROY* lettering equipment — provide superior resolution, even in large sizes, but take longer to plot. The coarser characters plot quickly to provide working-quality output.

*LEROY is a registered trademark of Keuffel & Esser Company.



The excellent resolution of the HP drafting plotters gives superior line quality as shown above. This photograph is unretouched and shows a section of a plot drawn on vellum with drafting pens.

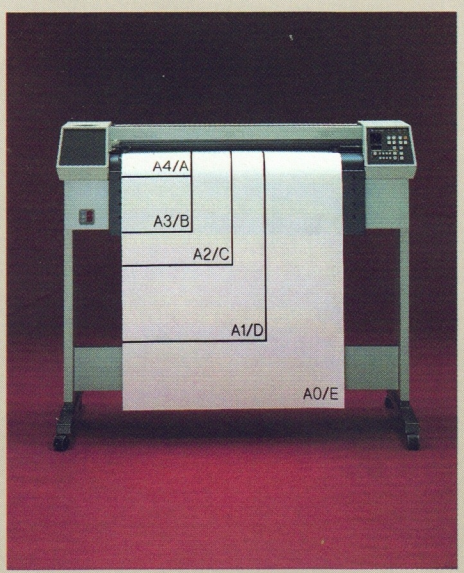


One benefit always comes through: the 7580B and 7585B are easy to use.

Plotting Limits Automatically Set

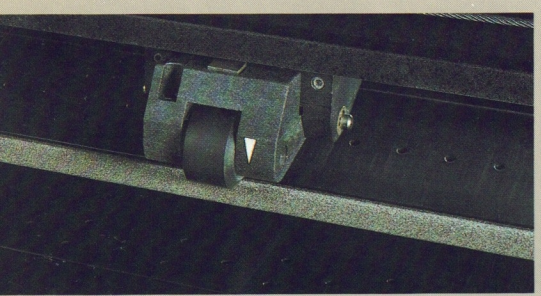
The HP drafting plotters plot on sheets of paper, vellum, or double-matte polyester film; they even accept preprinted forms. The 7580B accepts media up to A1/D size; the 7585B, up to A0/E size. Loading the drawing medium is easy: position it against the paper stops, move the adjustable pinch wheel to the right edge of the sheet, and press a button. Both plotters automatically sense the sheet size and establish borders along the edge to restrict pen movement. This ensures that no writing can occur off the medium.

These plotters use small drive wheels to move the drawing medium.

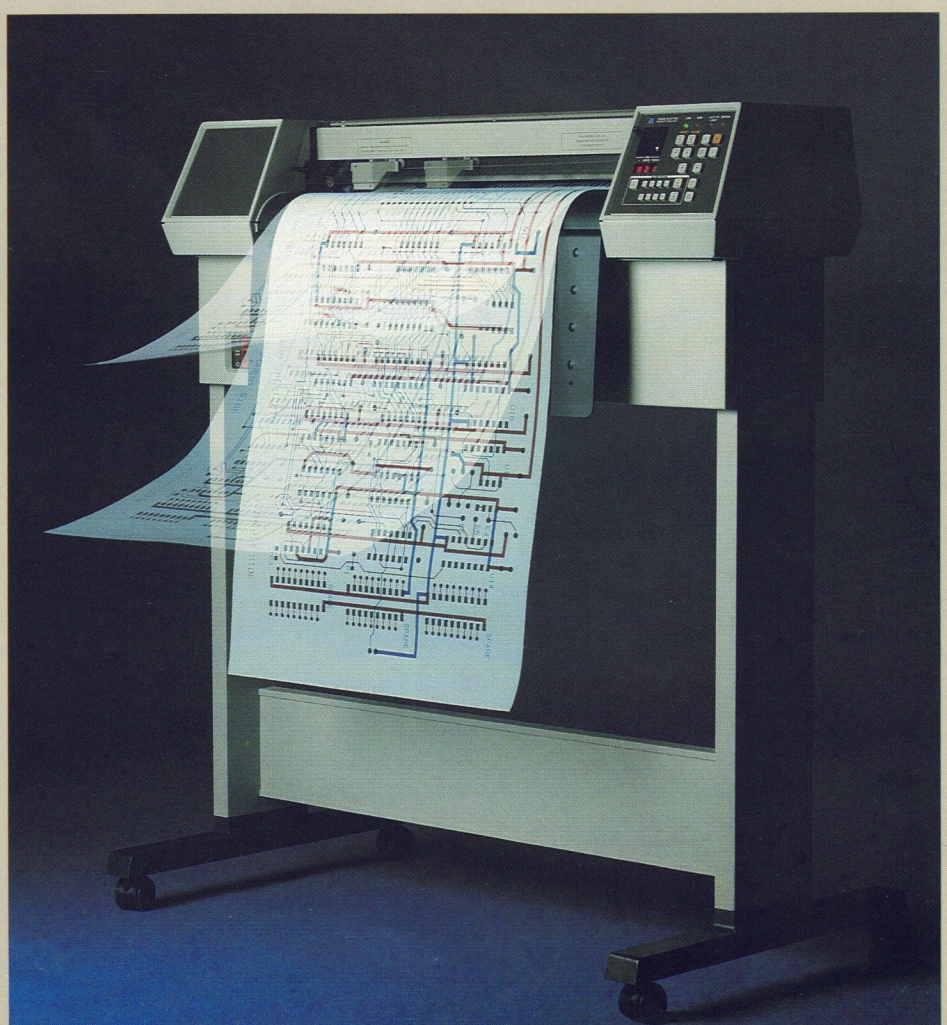


Simple Pushbutton Control

Convenience and flexibility are engineered into the front panel controls of HP drafting plotters. Only four buttons are required for operation. The CHART HOLD and CHART UNLOAD buttons lower and raise the pinch wheels. Either the VIEW or the REMOTE button causes the plotter to sense the size of the drawing medium and set all plotting parameters appropriate for that size. In addition, pushing REMOTE causes the plotter to process plotting instructions from the buffer. The VIEW button interrupts plotting and causes the sheet to be fully extended with no loss of incoming instructions.



The sheet is gripped between a rubber pinch wheel and a grit-covered wheel. Small particles on the grit wheel press into the sheet, forming a microscopic track. As the sheet moves back and forth, the particles fit into the same indentations. The low-mass, low-inertia mechanics in this drive system replace the heavy, bulky components of beltbed, flatbed, and drum plotters. This permits the use of smaller motors and lighter parts.



Specifications for the 7580B and 7585B Drafting Plotters

Plotting Area

Maximum plotting area	Drawing medium less margins
Margin sizes	
Normal mode	Three margins approximately 15 mm each, fourth margin approximately 39 mm
Expanded mode	Three margins approximately 5 mm each, fourth margin approximately 29 mm

Resolution

Smallest addressable move	0.0250 mm (0.000984 in.)
Mechanical resolution	0.003 mm (0.00012 in.)

Repeatability (for a given pen)

On paper or vellum at 10–30°C	0.05 mm (0.002 in.)
On double-matte polyester film (3 mil) at 10–30°C	0.10 mm (0.004 in.)

Endpoint Accuracy

On double-matte polyester film (3 mil) at 18–30°C, level floor	0.1% of the move or 0.25 mm (0.0098 in.), whichever is greater

Speed

Pen down	
Maximum	60 cm/s (24 in./s) independent of vector direction
From the program	1 to 60 cm/s (0.4 to 24 in./s) in increments of 1 cm/s
From the front panel	10 to 60 cm/s (4 to 24 in./s) in increments of 10 cm/s
Pen up	60 cm/s (24 in./s) regardless of pen-down speed

Acceleration

Maximum	4 g (39 m/s^2, 129 ft/s^2)
From the program	1 to 4 g (9.7 to 39 m/s^2, 32 to 128 ft/s^2) in increments of 1 g

Pen Force

From the program or front panel	10 to 66 grams in increments of 8 grams

Power Requirements

Source	100, 120, 220, 240 V~ −10%, +5%
Frequency	48–66 Hz
Consumption	182 W maximum

Environmental Range

Operating	
Temperature	0°C to 55°C
Relative humidity	5% to 95% (0°C to 40°C)
Nonoperating	
Temperature	−40°C to 75°C
Relative humidity	5% to 95% (0°C to 40°C)

Interfaces (selectable from a rear-panel switch)

HP-IB (IEEE 488-1978)	Implements the following HP-IB functions as defined in IEEE 488-1978: SH1, AH1, T6, L3, SR1, RL0, DC1, DT0, C0, PP0 for listen-only, PP1 for address greater than 7, and PP2 for address of 7 or less
RS-232-C/CCITT V.24	Asynchronous serial ASCII with switch selectable baud rates of 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600

Buffer

Size 1024 bytes

Pens

Number	8, automatic pen changing from carousel
Type	Fiber tip, drafting, roller ball

Media

Most standard paper, vellum, and double-matte polyester films which are 3 or 4 mil thick

Accessories Supplied with Plotters	HP Part No.
Interfacing and Programming Manual	07580-90024
Operator's Manual	07580-90023
Reference Card	07580-90021
Preferred Media Guide	07580-90016
Pen carousels	
Fiber tip	07580-60035
Drafting pen	07580-60081
Roller ball	07580-60082
Digitizing sight	07585-60191
Drafting pen bodies (4)	07580-60025
Drafting pen tips	
0.35 mm tip	9260-0588
0.70 mm tip	9260-0579
Drafting pen cleaning syringe	9282-0905
Drafting ink — black (3/4 oz container)	9260-0596
Drafting pen cleaning solution (5.2 oz container)	9282-0908
Fiber-tip pens with 0.3 mm tips	
Package of 4 (1 each — black, green, blue, and red)	5060-6810
Package of 6 (1 each — burnt orange, lime green, gold, brown, turquoise, and violet)	5060-6894
Roller-ball pens	
Package of 4 (black)	5061-5033
Package of 4 (red)	5061-5034
Package of 4 (green)	5061-5035
Package of 4 (blue)	5061-5036
Media sampler* (each sampler — 50 sheets of chart paper and 5 sheets of polyester film)	
For 7580B	
A1-size media	9280-0524
D-size media	9280-0523
For 7585B	
A0-size media	9280-0586
E-size media	9280-0585
Grit-wheel brush	8710-1386
Supplies organizer	4040-1953
Power cord (cord appropriate to destination of plotter)	
Male-to-male Interface Cable	8120-3258

*Metric or English media is included depending on the destination of the plotter.

Specifications for the 7580B and 7585B Drafting Plotters (Continued)

Accessories Available	HP Part No.
Service Manual	
For 7580B	07580-90022
For 7585B	07585-90002
Chart Paper	
D size, 200 sheet package	9280-0527
E size, 150 sheet package	9280-0587
A1 size, 200 sheet package	9280-0528
A0 size, 150 sheet package	9280-0590
Vellum	
D size, 150 sheet package	9280-0529
E size, 150 sheet package	9280-0593
A1 size, 150 sheet package	9280-0530
A0 size, 150 sheet package	9280-0594
Tracing bond	
D size, 150 sheet package	9280-0600
E size, 150 sheet package	9280-0598
A1 size, 150 sheet package	9280-0599
A0 size, 150 sheet package	9280-0597
Polyester film double-matte (3 mil)	
D size, 50 sheet package	9280-0526
E size, 50 sheet package	9280-0591
A1 size, 50 sheet package	9280-0525
A0 size, 50 sheet package	9280-0592
Writing Accessories Chest, hardwood	1540-0714
Carousel Pen Cap	
For fiber- or roller-ball pens, available individually	4320-0361
For drafting pens, available individually	4320-0365

Smaller paper, pens, drafting pen tips (0.18, 0.25, 0.35, 0.50, 0.70, and 1.00 mm), and other supplies are available. See the HP Computer Users Catalog (5953-2450) for a complete list. Media and drafting pen tips can also be purchased from engineering supply stores. The operator's manual lists recommended media and pen tips.

Ordering Options

Manual options*

016	for use with HP 9816 desktop computer
025	for use with HP 9825 desktop computer
026	for use with HP 9826 desktop computer
036	for use with HP 9836 desktop computer
045	for use with HP 9835A/B or HP 9845A/B desktop computer
047	for use with the HP 2647 graphics terminal
085	for use with the Series 80 personal computers
100	for use with HP 1000 computer
145	for use with HP 9845C desktop computer
300	for use with HP 3000 computer
900	for use with HP 9000 computer

*Use the manual option numbers to indicate the HP computer you will use with your plotter. If a graphics programming guide is available for that computer, it will be shipped with your plotter.

Supplemental Characteristics 7580B Drafting Plotter

Size of Medium	
Width	267 mm (10.5 in.) to 622 mm (24.5 in.), which includes standard sizes A4/A, A3/B, A2/C, A1/D, and architectural size D
Length	203 mm (8 in.) to 1231.9 mm (48.5 in.)
Plotter Size	
Height	1188 mm (46.8 in.)
Width	1087 mm (42.8 in.)
Depth	557 mm (21.9 in.)
Weight	
Net weight	59.1 kg (130 lb)
Shipping weight	approximately 114 kg (250 lb)
Price	$16 100

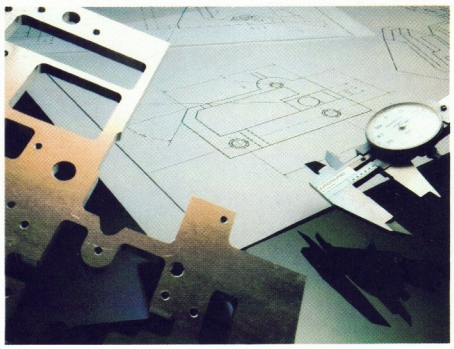
Supplemental Characteristics 7585B Drafting Plotter

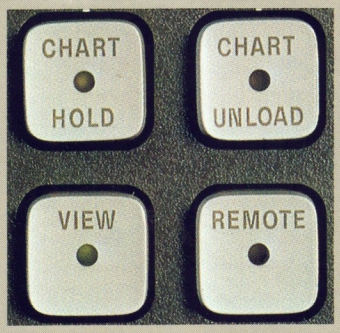
Size of Medium	
Width	267 mm (10.5 in.) to 298 mm (11.75 in.), which includes standard sizes A4/A and A3/B; **and** 546 mm (21.5 in.) to 927 mm (36.5 in.), which includes standard sizes A2/C, A1/D, A0/E, and architectural size E
Length	203 mm (8 in.) to 1231.9 mm (48.5 in.)
Plotter Size	
Height	1188 mm (46.8 in.)
Width	1392 mm (54.8 in.)
Depth	557 mm (21.9 in.)
Weight	
Net weight	70.4 kg (155 lb)
Shipping weight	approximately 131 kg (290 lb)
Price	$22 900

U.S.A. List Prices Only

Prices include delivery to any destination in the 50 United States. Prices do not include insurance or sales tax.

Prices and Data Subject to Change



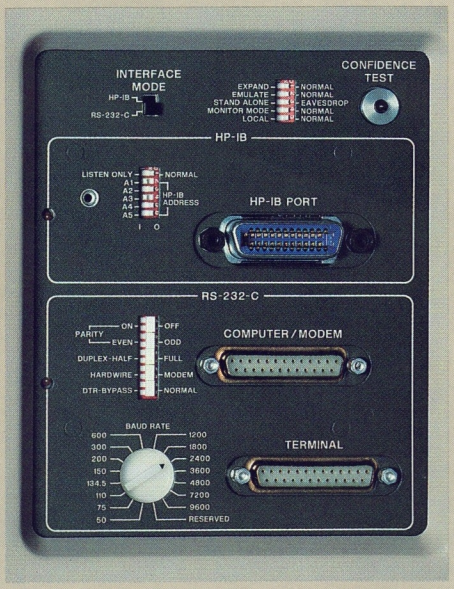


Other buttons on the front panel allow you to override the automatically set parameters or the program instructions. The scaling points, P1 and P2, can be changed to adjust your plot size. Your plot can be rotated 90 degrees or the plotter's axes can be aligned with those on a preprinted form. Pens can be changed, raised or lowered, and pen velocity and force can also be changed from the front panel. And a digital display indicates the current pen number, velocity, and force.

Using the joystick, the pen can be easily positioned anywhere within the plotting limits of the drawing medium. With the digitizing sight installed in the pen holder, the plotter becomes a point digitizer so that you can enter data from charts and maps.

Fits into Most Work Areas

The unique design of HP drafting plotters allows you to move them directly into work areas when and where you need a plotter. They're compact, requiring less space than most tables, and they're lightweight, making it easy to roll them from one area to another.



Dual Interface

With a switch on the back panel, you can select either of two interfaces: HP-IB (IEEE 488-1978) or RS-232-C/CCITT V.24. Interface flexibility adds another dimension of "portability" to a drafting plotter: not only will it move from area to area, it will interface with systems you have now as well as with systems you may have in the future.

Remote Modem Operation

Two RS-232 connectors are provided for connecting the plotter in series between a modem (or computer) and a terminal. In this "eavesdrop" configuration, the plotter is a passive listener until it receives a logical "on" command. It then acts on all data until it receives a logical "off" command. This series configuration requires only one computer port.

Low Power Consumption

Maximum power consumption for HP drafting plotters is 182 watts. Comparable plotters require from three to ten times as much power. So not only do you save money on your initial investment with the 7580B or 7585B, you also save on operating costs.

HP Reliability and Support

HP has manufactured plotters for over 14 years, and this experience shows in the exceptional reliability of our drafting plotters. Closely associated with reliability is the support you'll receive if you need information or if your plotter ever needs repair. In addition to our standard warranty, HP offers a variety of on-site service plans to meet your service needs. Also, HP drafting plotters have a self-test that quickly isolates problems for service personnel, thereby reducing the time it takes to get your plotter back into operation.

Many plotting operations can be achieved with single instructions.

Simple, Powerful Instruction Set

Programming is easy using the Hewlett-Packard Graphics Language (HP-GL). The HP drafting plotters accept 60 HP-GL instructions that are simple, yet powerful. You can easily remember the function of each instruction because each two-letter mnemonic suggests the English letter description of the corresponding plotter action. For example, the instruction SP selects a pen from the carousel, LT sets the line type, and PR plots relative to the current pen position.

The HP drafting plotters are vector plotters, which require only the end points in order to draw a line. Other plotting operations can also be achieved with single instructions. There are instructions to draw a circle or arc; to position labels; to change character size, slant, or direction; and to digitize. These plotters are even smart enough to adjust dashed line patterns to fit between any two points. They can rescale the plotting area in convenient user-defined units, rotate the plot 90 degrees, or change the graphic limits by creating "windows" that allow you to draw a portion of the original plot.

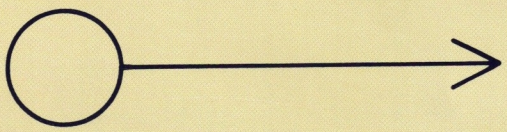
HP-GL is particularly effective when used in subroutine calls. These subroutines make it easier to write and debug the program since plotter functions are confined to specific sections of the program.

Software Support

HP drafting plotters are supported on HP computer systems, desktops, personal computers, and intelligent graphics terminals at two levels: graphics software for programmer support and graphics application software. Graphics software for programmer support gives you high-level, device-independent programming tools, such as graphics ROM commands and extensions to HPL, BASIC, and PASCAL. Graphics application software gives you a packaged solution to a specific graphics output need.

If you already have graphics application software that uses standard FORTRAN plotting subroutines, HP-ISPP (Hewlett-Packard Industry Standard Plotting Package, Model 17580A) makes it easy to add an HP drafting plotter to your system. This package has 13 callable subroutines written in standard FORTRAN: PLOTS, PLOT, BUFF, OFFSET, FACTOR, NEWPEN, WHERE, SYMBOL, NUMBER, SCALE, LINE, AXIS, and HPINIT.

Ask your HP sales representative for more information about graphics software for your system.



`"PUPA";X;",";Y`	**With pen up, moves to the coordinate X,Y**
`"CI300"`	**Draws a circle with a radius of 300 plotter units**
`"PUPA";X+300;",";Y`	**With pen up, moves to the edge of the circle**
`"PDPR";L;",0"`	**Puts the pen down and draws a line the length of L**
`"PR -250,125,250,-125, -250,-125"`	**Draws the arrowhead relative to the end point of the line**

These strings of HP-GL instructions might be part of a subroutine. When combined with statements that output to the plotter, they plot this figure in the location indicated by X and Y with a line length of L. To plot this example, the following were used: X = 0, Y = 0, which put the center point of the circle at the origin; and L = 2000, which designated the number of plotter units in the line length. Different system format conventions may cause these strings to be slightly different for your system.

HEWLETT PACKARD

For more information, call your local HP Sales Office or nearest Regional Office: Eastern (301) 258-2000; Midwestern (312) 255-9800; Southern (404) 955-1500; Western (213) 877-1282; Canadian (416) 678-9430. Or write Hewlett-Packard, 1501 Page Mill Road, Palo Alto, CA 94304. **In Europe:** Hewlett-Packard S.A., 7, rue du Bois-du-Lan, P.O. Box, CH 1217 Meyrin 2, Geneva, Switzerland. **In Japan:** Yokogawa-Hewlett-Packard Ltd., 29-21 Takaido-Higashi 3-chome, Suginami-ku, Tokyo 168.

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